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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/551,432	09/29/2005	Kenichi Machida	053087	2955

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WASHINGTON, DC 20036

EXAMINER
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BURKHART, ELIZABETH A

ART UNIT	PAPER NUMBER
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1762

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/25/2007	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

**Office Action Summary**

Application No.

10/551,432

Applicant(s)

MACHIDA ET AL.

Examiner

Elizabeth Burkhart

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on 29 September 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 3,4 and 8-14 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 3,4 and 8-14 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 September 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 1/12/2006 and 9/29/2005.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Specification***

1. The following guidelines illustrate the preferred layout for the specification of a utility application. These guidelines are suggested for the applicant's use.

#### **Arrangement of the Specification**

As provided in 37 CFR 1.77(b), the specification of a utility application should include the following sections in order. Each of the lettered items should appear in upper case, without underlining or bold type, as a section heading. If no text follows the section heading, the phrase "Not Applicable" should follow the section heading:

- (a) TITLE OF THE INVENTION.
- (b) CROSS-REFERENCE TO RELATED APPLICATIONS.
- (c) STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT.
- (d) THE NAMES OF THE PARTIES TO A JOINT RESEARCH AGREEMENT.
- (e) INCORPORATION-BY-REFERENCE OF MATERIAL SUBMITTED ON A COMPACT DISC.
- (f) BACKGROUND OF THE INVENTION.
  - (1) Field of the Invention.
  - (2) Description of Related Art including information disclosed under 37 CFR 1.97 and 1.98.
- (g) BRIEF SUMMARY OF THE INVENTION.
- (h) BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S).
- (i) DETAILED DESCRIPTION OF THE INVENTION.
- (j) CLAIM OR CLAIMS (commencing on a separate sheet).
- (k) ABSTRACT OF THE DISCLOSURE (commencing on a separate sheet).
- (l) SEQUENCE LISTING (See MPEP § 2424 and 37 CFR 1.821-1.825. A "Sequence Listing" is required on paper if the application discloses a nucleotide or amino acid sequence as defined in 37 CFR 1.821(a) and if the required "Sequence Listing" is not submitted as an electronic document on compact disc).

2. The Specification does not include a cross-reference to related applications in the first line. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 3, 4, and 9-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hirozawa et al. (JP 62-074048) and Kaino et al. (JP 01-117303) in view of Makita et al. (JP 2001-135511), Kadokura et al. ('739), and Nishiuchi et al. ('089).
5. Hirozawa et al. ('048) discloses a method of manufacturing a high-efficiency rare earth permanent magnet, wherein the magnet is a Nd-Fe-B system or a Pr-Fe-B system, and deterioration of magnetic properties is prevented by depositing a rare earth element such as Tb or Dy onto the previously grinded surface of said magnet by a sputtering method. Heat treatment is applied to said magnet in a vacuum after said sputtering deposition replacing a layer damaged by working with a reformed layer (Abstract). Diffusing the rare earth element has the effect of improving the magnetic characteristic (BH)<sub>max</sub> as evidenced by Kaino et al. ('303).
6. Kaino et al. ('303) discloses a method of depositing a rare earth element such as Tb or Dy onto a rare earth permanent magnet, wherein the magnet is a Nd-Fe-B system or a Pr-Fe-B system, by a sputtering method to avoid a decrease of the magnetic characteristic (BH)<sub>max</sub>. Heat treatment is performed after sputtering to diffuse the rare earth material not only on the surface of the magnet, but to the inward thereof (Abstract).
7. Hirozawa et al. ('048) and Kaino et al. ('303) do not disclose the shape or the surface to volume ratio of the magnet. Neither discloses placing said magnet on an electrode wire or in a wire basket between oppositely-disposed targets in a

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depressurized tank and rotating said magnet. Neither discloses recovering the magnetic characteristic  $(BH)_{\max}$  to at least  $280 \text{ kJ/m}^3$ .

8. Makita et al. ('511) discloses a microminiature rare earth permanent magnet coated with an anticorrosion covering wherein the surface area of  $S \text{ mm}^2$  and the volume of  $V \text{ mm}^3$  are variable and the surface to volume ratio  $(S/V)$  ranges from  $1\text{-}50 \text{ mm}^{-1}$  [0014] in order to prevent the degradation of the magnetic properties of said magnet [0001]. In a specific example,  $S/V$  is  $2 \text{ mm}^{-1}$  and the volume is  $27 \text{ mm}^3$  [0045].

9. It would have been obvious to one of ordinary skill in the art at the time of invention by applicant to coat the small magnet of Makita et al. ('511) with a rare earth element as suggested by Hirozawa et al. ('048) and Kaino et al. ('303) in order to better prevent the degradation of the magnetic properties of said magnet.

10. Kadokura et al. ('739) discloses a method for depositing a thin film onto a substrate by opposed target type sputtering to produce a uniform thin film at a high deposition rate (Col. 1, lines 19-22 and Col. 3, lines 24-27).

11. It would have been obvious to one of ordinary skill in the art at the time of invention by applicant to incorporate opposing targets as suggested by Kadokura et al. ('739) into the sputtering processes of Hirozawa et al. ('048) and Kaino et al. ('303) in order to produce a more uniform film at a high deposition rate.

12. Nishiuchi et al. ('089) discloses a vapor deposition apparatus comprising a vacuum chamber, an evaporating section for evaporating material, and a holding member for rare earth permanent magnets (Col. 3, lines 12-19 and Col. 4, lines 5-7).

The holding member may consist of cylindrical stainless steel mesh barrels in which the

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magnets may tumble (Col. 6, lines 44-50) or the holding member may be a structure which can hold hanging ring-shaped magnets (Fig. 6, Col. 10, lines 28-34). The open area of the mesh barrels depends on the size and shape of the magnets (Col. 9, lines 65-67). The vapor deposition apparatus is used to deposit a coating onto the magnets wherein the coating applied is uniform.

13. It would have been obvious to one of ordinary skill in the art at the time of invention by applicant to use the apparatus as suggested by Nishiuchi et al. ('089) in the vapor deposition processes of Hirozawa et al. ('048), Kaino et al. ('303), and Makita et al. ('511) wherein the magnet to be coated is rotated by either a wire through a hole in the magnet or the magnet being tumbled in a mesh basket in order to deposit a uniform coating.

14. It would have been obvious to one of ordinary skill in the art that the process of diffusing a layer of rare earth metal on a rare earth permanent magnet that had been damaged by cutting or grinding as suggested by Hirozawa et al. ('048) and Kaino et al. ('303), the permanent magnet with the dimensions as suggested by Makita et al. ('511), wherein the coating was deposited using the vapor deposition device of Nishiuchi et al. ('089) improves the magnetic characteristic (BH)<sub>max</sub>, therefore it is result effective and can be optimized through routine experimentation in order to recover the (BH)<sub>max</sub> value to 280 kJ/m<sup>3</sup> or more.

15. Regarding Claims 4 and 10, determining whether to diffuse the rare earth metal while depositing the coating at a high temperature or diffusing the rare earth metal by heat treatment after depositing the coating would merely constitute a design feature in

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which it would be obvious for one of ordinary skill to incorporate into the processes of Hirozawa et al. ('048) and Kaino et al. ('303).

16. Regarding Claims 11 and 13, Hirozawa et al. ('048) discloses the heat treatment to diffuse the rare earth metal after sputtering is performed in a vacuum or an inert atmosphere which would contain a concentration of impurity gases of less than 50 ppm.

17. Thus, claims 3, 4, and 9-14 would have been obvious within the meaning of 35 USC 103 over the combined teachings of Hirozawa et al. ('048), Kaino et al. ('303), Makita et al. ('511), Kadokura et al. ('739), and Nishiuchi et al. ('089).

18. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hirozawa et al. ('048) and Kaino et al. ('330) in view of Makita et al. ('511), Kadokura et al. ('739), and Nishiuchi et al. ('089) and in further view of Kamiya (JP2000-319778).

19. Hirozawa et al. ('048), Kaino et al. ('330), Makita et al. ('511), Kadokura et al. ('739), and Nishiuchi et al. ('089) are relied upon as discussed in the 35 USC 103(a) rejection above. These references fail to disclose using ring-like targets during the sputtering deposition process.

20. Kamiya ('778) discloses using oppositely-disposed ring-like targets in a sputtering process to form a high quality thin film at a high speed.

21. It would have been obvious to one of ordinary skill in the art at the time of invention by applicant to incorporate ring-like targets as suggested by Kamiya ('778) into the processes of Hirozawa et al. ('048), Kaino et al. ('330), Makita et al. ('511), Kadokura et al. ('739), and Nishiuchi ('089) in order to produce a high quality thin film at high speeds.

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22. Thus, claim 8 would have been obvious within the meaning of 35 USC 103 over the combined teachings of Hirozawa et al. ('048), Kaino et al. ('330), Makita et al. ('511), Kadokura et al. ('739), Nishiuchi et al. ('089), and Kamiya ('778).

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Elizabeth Burkhart whose telephone number is (571) 272-6647. The examiner can normally be reached on Monday-Thursday, 7:00 AM-5:30 PM, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

eab



TIMOTHY MEEKS  
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